Clin. Nutr. 2023; 42 (11): 2270-2281. DOI: 10.1016/j.clnu.2023.09.029

A fluid journey: experiments that influenced clinical practice

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Conflict of interest: none

ABSTRACT. This review summarizes work on fluid and electrolyte balance over the past 25 years and shows how the studies have influenced clinical practice. The main theme is the biochemical, physiological and clinical problems caused by inappropriate use of saline solutions including the hyperchloraemic acidosis caused by 0.9 % saline. The importance of accurate and near-zero fluid balance in clinical practice is also emphasised. Perioperative fluid and electrolyte therapy has important effects on clinical outcome in a U-shaped dose response fashion, in which excess or deficit progressively increases complications and worsens outcome. Salt and water overload, with weight gain in excess of 2.5 kg worsens surgical outcome, impairs gastrointestinal function and increases the risk of anastomotic dehiscence. Hyperchloraemic acidosis caused by overenthusiastic infusion of 0.9 % saline leads to adverse outcomes and dysfunction of many organ systems, especially the kidney. Salt and water deficit causes similar adverse effects as fluid overload at the cellular level and also leads to worse outcomes. These findings have been incorporated in the British consensus Guidelines on Intravenous Fluid Therapy for Adult Surgical Patients (GIFTASUP) and National Institute for Health and Care Excellence (NICE) guidelines on intravenous fluid therapy in adults in hospital and are helping change clinical practice and improve outcomes.

KEY WORDS: fluid therapy, 0.9 % saline, hyperchloremic acidosis, normovolemia, near-zero fluid balance.